A photograph of a worker wearing a blue hard hat and a blue work shirt. The worker is focused on a task, with their hands positioned on a wooden structure. The background is a bright, slightly blurred indoor setting, possibly a workshop or construction site. The overall tone of the image is professional and industrious.

Employment and Occupations in the Skilled Trades

December 2015 Update

Prepared by:

State of Michigan

Department of Technology, Management and Budget

Bureau of Labor Market Information and Strategic Initiatives

Employment and Occupations in the Skilled Trades

State of Michigan

Department of Technology, Management and Budget

Bureau of Labor Market Information and Strategic Initiatives

Jason S. Palmer

Director

By:

Robert Walkowicz
Economic Analyst

Michelle Wein
Economic Analyst

BOX 1: KEY FINDINGS

	2013 Report	2015 Report	Change
Employment			
Skilled Trades	185,500 (2012)	194,780 (2014)	↑
All Occupations	3,918,100 (2012)	4,057,900 (2014)	↑
Skilled Trades/All Occupations	4.7% (2012)	4.8% (2014)	↑
Hourly Wages Ranges			
Skilled Trades	\$13 - \$34 (median \$21) (2012)	\$12 - \$34 (median \$21) (2014)	=
All Occupations	\$8 to \$39 (median \$16) (2012)	\$9 to \$40 (median \$17) (2014)	↑
Real-Time Online Job Demand			
Skilled Trades	5,000 (2013)	8,100 (2015)	↑
Change, Skilled Trades	+19.9 % (2012-2013)	+18 % (2014-2015)	↓
All Occupations	136,000 (2013)	208,800 (2015)	↑
Change, All	+10.3% (2012-2013)	+30.4% (2014-2015)	↑
Skilled Trades/All Occupations	3.5% (2013)	3.9% (2015)	↑
Short Term Growth Projections			
Skilled Trades	+2.1%, by 2013	+5.6%, by 2016	↑
All Occupations	+1.3%, by 2013	+2.9%, by 2016	↑
Long Term Growth Projections			
Skilled Trades	+7.4%, 2020	+13.9%, 2022	↑
All Occupations	+8.5%, by 2020	+8.7%, by 2022	↑
Average Annual Openings			
Skilled Trades	5,900 (2010-2020)	6,600 (2012-2022)	↑
All Occupations	130,000 (2010-2020)	139,500 (2012-2022)	↑
Skilled Trades/All Occupations	4.5% (2010-2020)	4.7% (2012-2022)	↑
Job Vacancy Survey			
Skilled Trades	N/A	5,400 (2015)	N/A
All Occupations	N/A	145,000 (2015)	N/A
Skilled Trades/All Occupations	N/A	3.7% (2015)	N/A
Apprenticeships/Program Completers			
Active Apprentices	8,371 (2012)	9,352 (2014)	↑
Apprentice Completers	1,249 (2012)	754 (2014)	↓
Apprenticeship Programs	1,109 (2012)	982 (2014)	↓
Degrees/Certifications	3,000 (2012)	3,500 (2014)	↑

EXECUTIVE SUMMARY

- With nearly 5 percent of statewide employment, Skilled Trades occupations are an important source of jobs in Michigan's economy. Skilled Trades occupations have median hourly wages of \$20.66, with the 10th to 90th percentile wages ranging from \$11.95 to \$33.67. Most Skilled Trades occupations pay a solid wage when compared to the all occupational average of \$16.70 (with a range from \$8.68 to \$40.24).
- Skilled Trades occupations can be divided into three categories: Skilled Industrial Trades, Skilled Construction Trades, and Skilled Service Trades. This report will focus on Industrial and Construction Trades (**Appendix 1**). While both categories provide employment opportunities in Michigan, the number of Industrial Trades jobs is nearly double the number of Construction Trades jobs.
- Today, Skilled Trades workers are in even higher demand than two years ago, evidenced by the 8,100 online advertised job vacancies (up by 38 percent from the time of the 2013 report). Furthermore, short-term occupational projections call for continued demand in the short-run as Skilled Trades employment is expected to expand by 5.6 percent through 2016.
- According to the State of Michigan's 2015 Job Vacancy Survey, there are about 5,400 job openings for Skilled Trades positions in Michigan, or approximately 3.7% of all available positions.
- In 2014, the number of degrees/certificates awarded in major trades-related programs reached new heights of 3,500.
- While the number of individuals that completed an apprenticeship through one of Michigan's apprenticeship programs fell slightly, the number of active apprentices enrolled in programs has increased, indicating there is still interest in these positions.

INTRODUCTION

In 2013, the Bureau of Labor Market Information and Strategic Initiatives released a report on the Skilled Trades in Michigan, detailing employment, wage, apprenticeship and certification, and employment demand information. Two years later, this update will again take a look at the Skilled Trades occupations in Michigan and their future. The previous report presented encouraging numbers as to the quality and outlook of Skilled Trades jobs. This report will expand on the optimism as the numbers for the future look even brighter now.

Understanding the current and future dynamics of Skilled Trades occupations is useful because of the importance of these occupations in the labor market. With a large and growing number of jobs and above average earnings, the Skilled Trades provide an increasingly attractive alternative to spending a lengthy period of time earning a college degree. Instead of spending time solely in the classroom, most Skilled Trades positions offer on-the-job training or apprenticeships so workers can earn a wage while learning their trade.

EMPLOYMENT

In 2014 Michigan had 194,780 Skilled Trades jobs, which was 4.8 percent of all jobs in Michigan, compared to 4.4 percent of all jobs nationwide. In 2012 there were 185,500 Skilled Trades jobs in Michigan, representing nearly the same concentration as today. There were 148,640 Industrial Trades jobs, nearly double the 75,090 Construction Trades jobs.¹

- Skilled Trades occupations are employed in a variety of industries, but are primarily concentrated in *Manufacturing* and *Construction*. The *Manufacturing* industry accounts for 38.4 percent of all Skilled Trades jobs, while *Construction* has 30.6 percent. The next highest-ranking major industry is *Real estate and rental and leasing* with only 4.4 percent. Box 2 highlights more detailed industries along with their share of all Skilled Trades employment and the Skilled Trades median wages in those industries.
- Michigan’s 2015 top Skilled Trades job titles mostly match those from the 2013 report. The key change was a rise in the rankings of *Carpenters*, *Industrial machinery mechanics* and *Welders* due to employment growth. **(Box 3)**
- Top titles for the nation are similar to those in Michigan, though there are exceptions. For example, *Tool and Die Makers* are larger in Michigan due to the state’s strong Manufacturing industry while *Plumbers*, *Pipefitters and Steamfitters* are stronger nationally reflecting growth in *Natural resources* and *Construction* elsewhere. **(Box 3)**

BOX 2: SKILLED TRADES: LEADING INDUSTRIES

TOP INDUSTRIES FOR SKILLED TRADES

(Percent of Employment • Median Wage)

Specialty Trade Contractors	22.9% • \$22.91
Transportation Equipment Manufacturing	11.1% • \$29.30
Fabricated Metal Product Manufacturing	9.4% • \$17.60
Machinery Manufacturing	8.6% • \$19.78
Construction of Buildings	6.0% • \$20.41
Public Administration	4.3% • \$21.91
Real Estate	4.2% • \$13.69

Source: BLMISI, Occupational Employment Statistics

BOX 3: SKILLED TRADES: LEADING OCCUPATIONS

TOP SKILLED TRADES OCCUPATIONS

(Employment Count • Median Wage)

General Maintenance and Repair Workers	40,370 • \$16.45
Machinists	26,550 • \$18.39
Electricians	17,610 • \$28.07
Carpenters	15,420 • \$20.24
Industrial Machinery Mechanics	13,750 • \$23.43
Welders, Cutters, Solderers, and Brazers	12,370 • \$16.68
Tool and Die Makers	11,750 • \$24.42

Source: BLMISI, Occupational Employment Statistics

¹ The reason the numbers add up to more than the total is because some occupations, such as *Plumbers* and *Electricians*, appear in both lists.

WAGES

Employment in the Skilled Trades is associated with above-average earnings. In addition, given the education and training requirements for these job titles, workers are likely to avoid the burden of student loan debt.

- In Michigan, Skilled Trades have a wage range of \$11.95 to \$33.67 per hour with a median of \$20.66, outpacing the statewide wages with a range of \$8.68 to \$40.24 and a median wage of \$16.70. The overall nominal wage for Skilled Trades occupations was virtually unchanged from 2012 levels. **(Box 4)**
- Skilled Trades occupations also present another option of postsecondary education and training, by offering higher wages than those obtainable for other occupations not requiring any college education. The median wage for occupations only requiring a high school diploma or less is \$13.41, significantly lower than the median for Skilled Trades occupations, which typically require on-the-job training or an apprenticeship. **(Box 4)**
- There is also separation within the Skilled Trades occupations. While much less prevalent than Industrial Skilled Trades, Construction Skilled Trades typically offer higher wages. Construction Trades have a range of \$13.85 to \$35.71 with a median of \$23.22, while Industrial Trades have a lower range of \$11.64 to \$33.97 and a lower median of \$20.41.
- Wages can vary greatly by industry. Skilled Trades workers in *Transportation equipment manufacturing* earn anywhere from 28 to 114 percent more than workers in the other top six industries, and have a median wage of over \$6 more than the next highest industry, *Specialty Trade Contractors*. **(Box 2)**

BOX 4: EDUCATION, TRAINING, AND WAGES IN THE SKILLED TRADES

TOP PAYING INDUSTRIAL TRADES JOBS

(Median Wage • Education / Training)

Electrical and Electronics Repairers

\$35.08 • Long-term On-the-Job Training (OJT)

Millwrights

\$31.16 • Apprenticeship

Precision Instrument and Equipment Repairers

\$30.41 • Long-term OJT

TOP PAYING CONSTRUCTION TRADES JOBS

Elevator Installers and Repairers

\$38.41 • Apprenticeship

Plumbers, Pipefitters, and Steamfitters

\$28.21 • Apprenticeship

Electricians

\$28.07 • Apprenticeship



Source: BLMISI, Occupational Employment Statistics

JOB REQUIREMENTS AND READINESS

Skilled Trades occupations emphasize practical and applied training, often requiring much more on-the-job training than formal education. Sponsored training programs and apprenticeship programs – administered by the U.S. Department of Labor – will often satisfy the work experience requirements for these positions.

Skills for the Skilled Trades

- Analyzing Skilled Trades occupations through the Occupational Information Network (O*Net) framework can help identify which skills and abilities are currently in demand in the labor market. For occupations within the Skilled Trades, the most commonly required skills are Critical Thinking, Active Listening, Operation Monitoring, Operation and Control, and Monitoring. **(Box 5)**
- Compared to other occupations, Skilled Trades positions require a higher degree of psychomotor abilities, defined by O*Net as “abilities that influence the capacity to manipulate and control objects.” Indeed, essential abilities include Near Vision, Arm-Hand Steadiness, Manual Dexterity, Control Precision and Problem Sensitivity. **(Box 5)**
- Beyond O*Net, researching online advertised job vacancies provides another perspective on the skills required to excel in the Skilled Trades. According to The Conference Board’s Help Wanted Online Database, most online postings are searching for candidates with experience in their fields and certifications in everything from CAD/CAM to G code (for *Machinists*), and Lean Manufacturing (for *Industrial Machinery Mechanics*).

BOX 5: SKILLS AND ABILITIES FOR SKILLED TRADES OCCUPATIONS

SKILLS

1. **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
2. **Active Listening:** Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
3. **Operation Monitoring:** Watching gauges, dials or other indicators to make sure a machine is working properly.
4. **Operation and Control:** Controlling operations of equipment or systems.
5. **Monitoring:** Monitoring/assessing performance of yourself, other individuals, or organizations to improvements or to take corrective action.

ABILITIES

1. **Near Vision:** The ability to see details at close range (within a few feet of the observer).
2. **Arm-Hand Steadiness:** The ability to keep your hand and arm steady while moving your arm or while holding your arm and hand in one position.
3. **Manual Dexterity:** The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate or assemble objects.
4. **Control Precision:** The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
5. **Problem Sensitivity:** The ability to tell when something is wrong or likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

Source: O*Net Online

APPRENTICESHIPS AND PROGRAM COMPLETERS

On-the-job training and apprenticeships are a key requirement and an important component of Skilled Trades positions. In fact, virtually all Skilled Trades occupations require significant on-the-job training. According to the Bureau of Labor Statistics, an apprenticeship is defined as “a formal relationship between a worker and a sponsor that consists of a combination of on-the-job training and related occupation-specific technical instruction in which the worker learns the practical and theoretical aspects of an occupation.”

- In 2014, there were 754 individuals that completed an apprenticeship through one of Michigan’s 982 active apprenticeship programs. While, in the last three years the number of completers has decreased by almost 40 percent -- mirroring the slide in active programs -- the number of active apprentices enrolled in programs has increased, indicating there is still interest in these positions. **(Box 6)**
- Over 3,500 individuals completed a trades-related degree or certificate through Michigan’s universities, community colleges, or other training providers in 2014. Leading programs were Vehicle Maintenance and Repair, Precision Metal Working, and Building and Construction Finishing Management and Inspection. **(Box 7)**

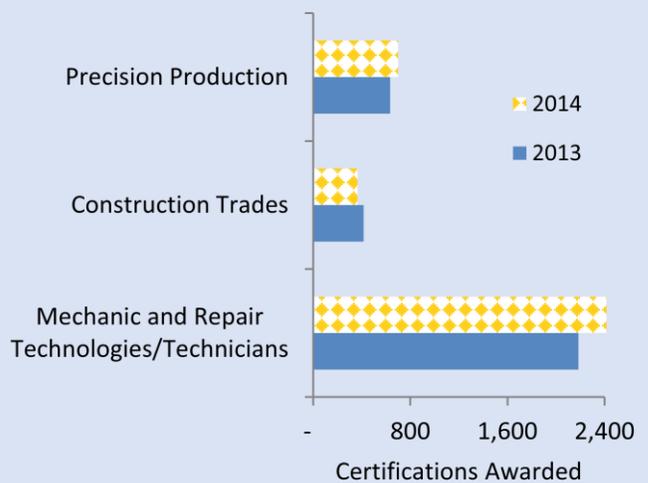
BOX 6: APPRENTICESHIPS IN MICHIGAN



Source: U.S. Department of Labor, Office of Apprenticeships

Note: Program Completers and Active Apprentices are listed on the left axis. Programs are listed on the right axis.

BOX 7: DEGREE CERTIFICATIONS IN MICHIGAN



Source: National Center for Education Statistics

Note: Of the 38 Skilled Trades occupations analyzed in this report, 30 fit into one the CIP programs listed above. Five occupations have no match to a CIP program, while three are matched into different programs.

EMPLOYMENT DEMAND

There are a variety of sources that can be used to determine the demand for Skilled Trades occupations. The Job Vacancy Survey (JVS), recently conducted by the Bureau of Labor Market Information and Strategic Initiatives (BLMISI), asked employers to report their job openings for the second quarter of 2015. Also, the Conference Board's Help Wanted Online database displays un-duplicated online advertised job postings for various job titles. The BLMISI also produces employment projections to estimate future short-term and long-term demand.

- The 2015 JVS survey estimates that there were about 145,000 job openings in Michigan, with Skilled Trades accounting for nearly 5,400, or 3.7 percent, of all openings. Demand for these job titles were concentrated in *Manufacturing* and *Construction*, with overall vacancies measuring 12,900 and 6,400, respectively. **(Box 8)**
- According to The Conference Board's Help Wanted Online Database, there are 8,100 online advertised job postings in the Skilled Trades in Michigan. Since December 2014, online ads for Skilled Trades rose 18 percent, and have increased by almost five times since the end of the recession in June 2009. Increased demand reflects improvements in the state's economy, particularly in industries that employ Skilled Trades workers. **(Box 8)**

BOX 8: CURRENT OPPORTUNITIES IN THE SKILLED TRADES

JOB VACANCY SURVEY: MOST SKILLED TRADES VACANCIES

1. General Maintenance and Repair Workers
2. Industrial Machinery Mechanics
3. Heating, Air Conditioning, and Refrigeration Mechanics and Installers
4. Electricians
5. Plumbers

Source: 2015 Job Vacancy Survey (JVS)

HELP WANTED ONLINE: MOST SKILLED TRADES OPENINGS

1. General Maintenance and Repair Workers
2. Construction Carpenters
3. Machinists
4. Electricians
5. Welders, Cutters and Welder Fitters

Source: The Conference Board, Help Wanted Online® Data Series

BOX 9: EMPLOYMENT OPPORTUNITIES IN THE SKILLED TRADES THROUGH 2022

FASTEST GROWING SKILLED TRADES OCCUPATIONS (2012-2022)

1. Insulation Workers, Mechanical: 38.3%
2. CNC Machine Tool Programmers: 37.9%
3. Brickmasons: 28.7%
4. Industrial Machinery Mechanics: 25.3%
5. Riggers: 22.2%

MOST ANNUAL SKILLED TRADES JOB OPENINGS (2012-2022)

1. Machinists: 1,125
2. General Maintenance and Repair: 1,000
3. Industrial Machinery Mechanics: 697
4. Electricians: 620
5. Carpenters: 511

Source: BLMISI, Long-Term Employment Projections

- Short-term projections show that Skilled Trades jobs have a high expected growth rate of 5.6 percent by 2016, which is almost double the expected rate for all jobs in Michigan of 2.9 percent. This is an increase over the expected rate of gain through 2013 of 2.1 percent from the previous report. Construction Skilled Trades are expected to grow faster at 6.9 percent compared to 5.0 percent for Industrial Skilled Trades.
- Long-term projections show all Skilled Trades jobs expanding at 13.9 percent through 2022, well above the expected 8.7 percent rate for all jobs in Michigan, with about 6,600 annual openings. This is a marked increase over the expectations from two years ago, when Skilled Trades jobs were projected to advance at only 7.6 percent with about 4,000 annual openings. Furthermore, in the 2022 projections, Construction Skilled Trades jobs are expected to increase slightly faster at 15.1 percent compared to 13.1 percent for Industrial Skilled Trades. **(Box 9)**
- The occupations with the most expected annual openings are very similar to the list of top jobs by employment, but the fastest growing jobs look very different. The fastest growing jobs are mostly lower employment level jobs, so their high growth rate will not translate into a large increase in gross jobs. Only one occupation, *Industrial machinery mechanics* appears in both lists. **(Box 9)**
- Eight Skilled Trades job titles are included in Michigan’s Hot 50 Publication: *CNC programmers; Electricians; Heating, air conditioning and refrigeration mechanics and installers; Industrial machinery mechanics; Machinists; Millwrights; Operating engineers; and Plumbers, pipefitters and steamfitters.*

BOX 10: WOMEN IN THE SKILLED TRADES

Nationally in 2014, only 3 percent of all Skilled Trades workers were women, numbering approximately 209,130 of the nationwide 7,147,000 Skilled Trades workers. Though this is slightly elevated from the 2013 report, in which 2.7 percent of all Skilled Trades workers were women, it has not changed much. In comparison, in 2014, 46.9 percent of all workers were women.

A gender breakdown of the Skilled Trades occupations with the most women reveals that women are still under-represented in these positions. Indeed, of the 38 Skilled Trades occupations identified by this report, national surveys detect minimal levels of women workers in 12 occupations.

Top Occupations	Percentage of Women (2014)	Percentage of Women (2012)
Precision Instrument and Equipment Repairers	14.2%	16.0%
Cabinetmakers and Bench Carpenters	9.9%	N/A
CNC Machine Tool Programmers	8.1%	8.4%
Painters	6.0%	5.5%
Sheet Metal Workers	5.2%	4.6%
Welders, Cutters, Solderers, and Brazers	4.8%	4.8%
Machinists	4.5%	3.8%
Water and Wastewater Treatment Plant and System Operators	4.5%	4.5%
General Maintenance and Repair Worker	3.2%	2.2%
Industrial Machinery Mechanics	2.8%	1.9%

Source: BLMSI, Fast Facts Portal / Bureau of Labor Statistics

CONCLUSION

Skilled Trades are and will continue to be a bright spot for the Michigan economy. This report shows that there is a positive outlook for job gains in both the short and long-term. Wages for Skilled Trades continue to compare favorably to the wages of other occupations that do not require a college degree.

- The report from two years ago showed that Skilled Trades employment would be advancing slowly in the short-term and modestly in the long-term, but there has been a large change for the better in the past two years. Short-term and long-term projections both forecast significant increases from the previous report, and also show larger growth expected for Skilled Trades than for Michigan overall. And it's not just the future that looks promising for Skilled Trades, the 2015 Job Vacancy Survey and the Help Wanted Online database show that a healthy amount of current openings are for Skilled Trades occupations.
- Wages for Skilled Trades occupations continue to remain above the wages for Michigan overall and well above wages for workers without a college degree, despite remaining at the same levels registered in the previous report. While the Skilled Trades provide a good alternative to simply attending college and offer above-average income, wages for these positions fall well short of the median wage for jobs requiring an associate's degree (\$27.56). Wages for Skilled Trades occupations vary by industry sector. *Transportation equipment manufacturing* is obviously a large part of the Michigan economy, is the second largest employer of Skilled Trades jobs and provides very high wages for Skilled Trades workers.
- Skilled Trades jobs typically do not require much formal education or a college degree of any kind. Most of them just require a high-school diploma and either on-the-job training or an apprenticeship, which helps make these jobs enticing to workers just entering the labor force who do not want, or cannot afford, to go to college.
- One challenge from the report is the lack of women in the Skilled Trades. Whether it is from a lack of opportunity for women, or a lack of interest from women, Skilled Trades remain a male dominated field. The highest female concentration in any Skilled Trades occupation is only 14.2 percent. Women currently comprise only 3 percent of Skilled Trades jobs, up slightly from the 2013 report (2.7 percent).

Skilled Trades Occupations

Appendix 1

SOC	Occupation Title
47-2011	Boilermakers
47-2111	Electricians
47-2152	Plumbers, Pipefitters, and Steamfitters
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
49-9041	Industrial Machinery Mechanics
49-9043	Maintenance Workers, Machinery
49-9044	Millwrights
49-9069	Precision Instrument and Equipment Repairers, All Other
49-9071	General Maintenance and Repair Workers
49-9096	Riggers
51-4012	CNC Machine Tool Programmers
51-4041	Machinists
51-4061	Model Makers, Metal and Plastic
51-4062	Patternmakers, Metal and Plastic
51-4111	Tool and Die Makers
51-4121	Welders, Cutters, Solderers, and Brazers
51-4194	Tool Grinders, Filers, and Sharpeners
51-7011	Cabinetmakers and Bench Carpenters
51-7031	Model Makers, Wood
51-7032	Patternmakers, Wood
51-8021	Stationary Engineers and Boiler Operators
51-8031	Water and Wastewater Treatment Plant and System Operators

**Skilled
Industrial
Trades**

	SOC	Occupation Title
Skilled Construction Trades	47-2011	Boilermakers*
	47-2021	Brickmasons and Blockmasons
	47-2031	Carpenters
	47-2044	Tile and Marble Setters
	47-2051	Cement Masons and Concrete Finishers
	47-2053	Terrazzo Workers and Finishers
	47-2073	Operating Engineers and Other Construction Equipment Operators
	47-2111	Electricians*
	47-2121	Glaziers
	47-2132	Insulation Workers, Mechanical
	47-2141	Painters, Construction and Maintenance
	47-2151	Pipelayers
	47-2152	Plumbers, Pipefitters, and Steamfitters*
	47-2161	Plasterers and Stucco Masons
	47-2211	Sheet Metal Workers
	47-2221	Structural Iron and Steel Workers
	47-4021	Elevator Installers and Repairers
	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
	49-9096	Riggers*
	53-7021	Crane and Tower Operators

*Primary Category for Skilled Trades